

SERVICE MANUAL

DUPLEXER

MODEL DPLX U45

INSTRUCTION SHEET

DUPLEXER DPLXU45

This 45-watt duplexer assembly is configured for 5¼" x 19" rack space mounting. It employs a 6-cavity band-reject circuit of coaxial resonators to provide maximum isolation between the transmitter and receiver simultaneously with minimum insertion losses for the transmit and receiver functions. The circuit block diagram is shown in Figure 1 and typical Tx and Rx channel response curves are shown in Figure 2. Electrical and mechanical specifications are tabulated in specification drawing 104-249.

These duplexers are factory tuned with a network analyzer to customer's specific transmitter and receiver frequencies, and should require no further adjustment during station installation. If duplexer realignment becomes necessary, it is important that the reflections at the transmitter and receiver ports be viewed simultaneously as the isolation notches are optimized, so that transmitter-to-receiver isolation is not obtained at the expense of excessive VSWR's at the transmitter or receiver ports.

!WARNING!

DUPLEXERS SHOULD NEVER BE TUNED WITH TRANSMITTER POWER APPLIED!

INSTRUCTIONS

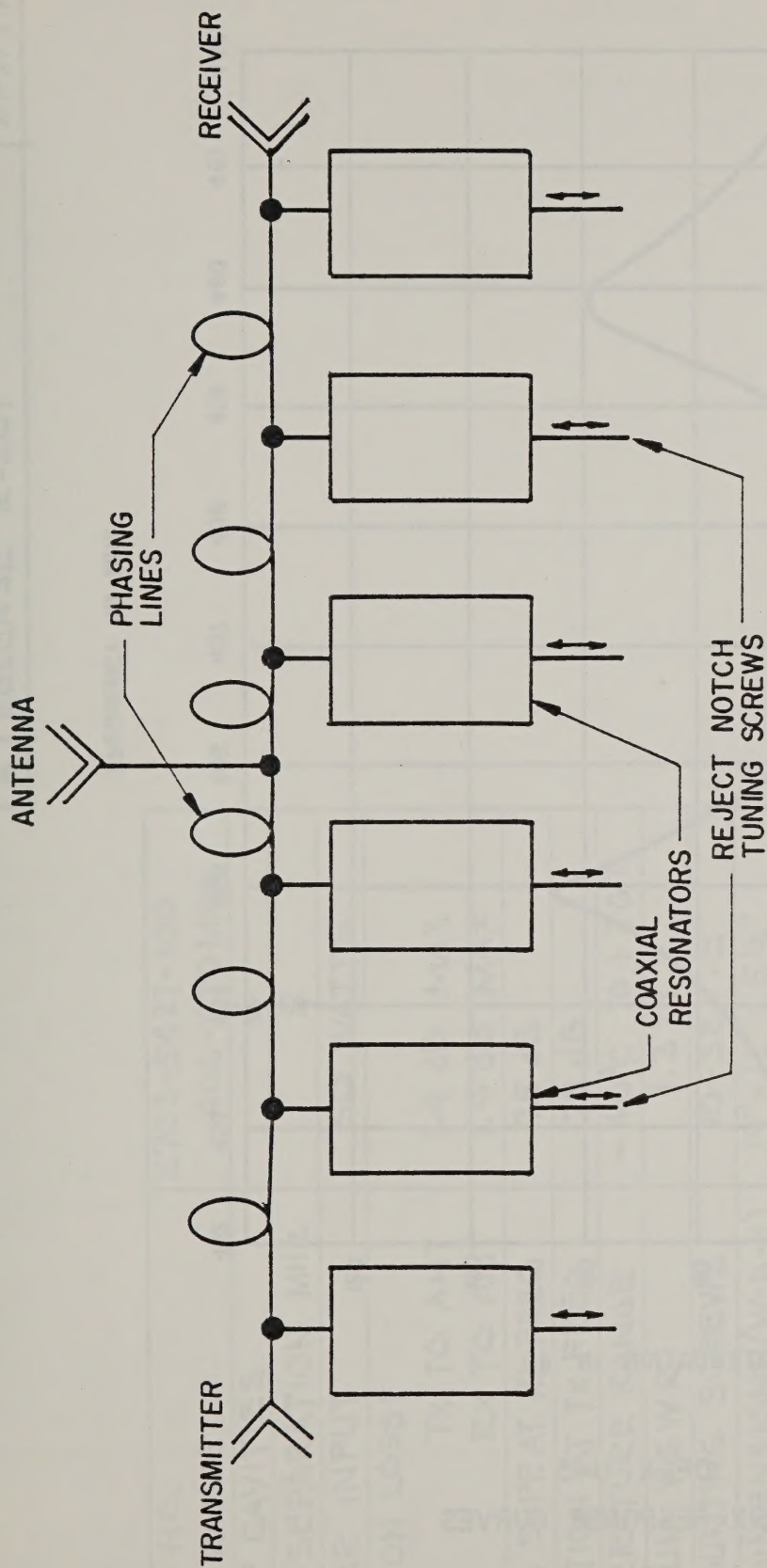
CONTENTS

This 15-page booklet is designed for use by the
radio operator. It contains a 4-page table of
instructions to guide the operator in the use of
the radio. The instructions are divided into three
parts: 1. General instructions. 2. Instructions
for the use of the radio. 3. Instructions for
the use of the radio in the field.

The first part of the booklet contains general
instructions for the use of the radio. The second
part contains instructions for the use of the radio
in the field. The third part contains instructions
for the use of the radio in the field.

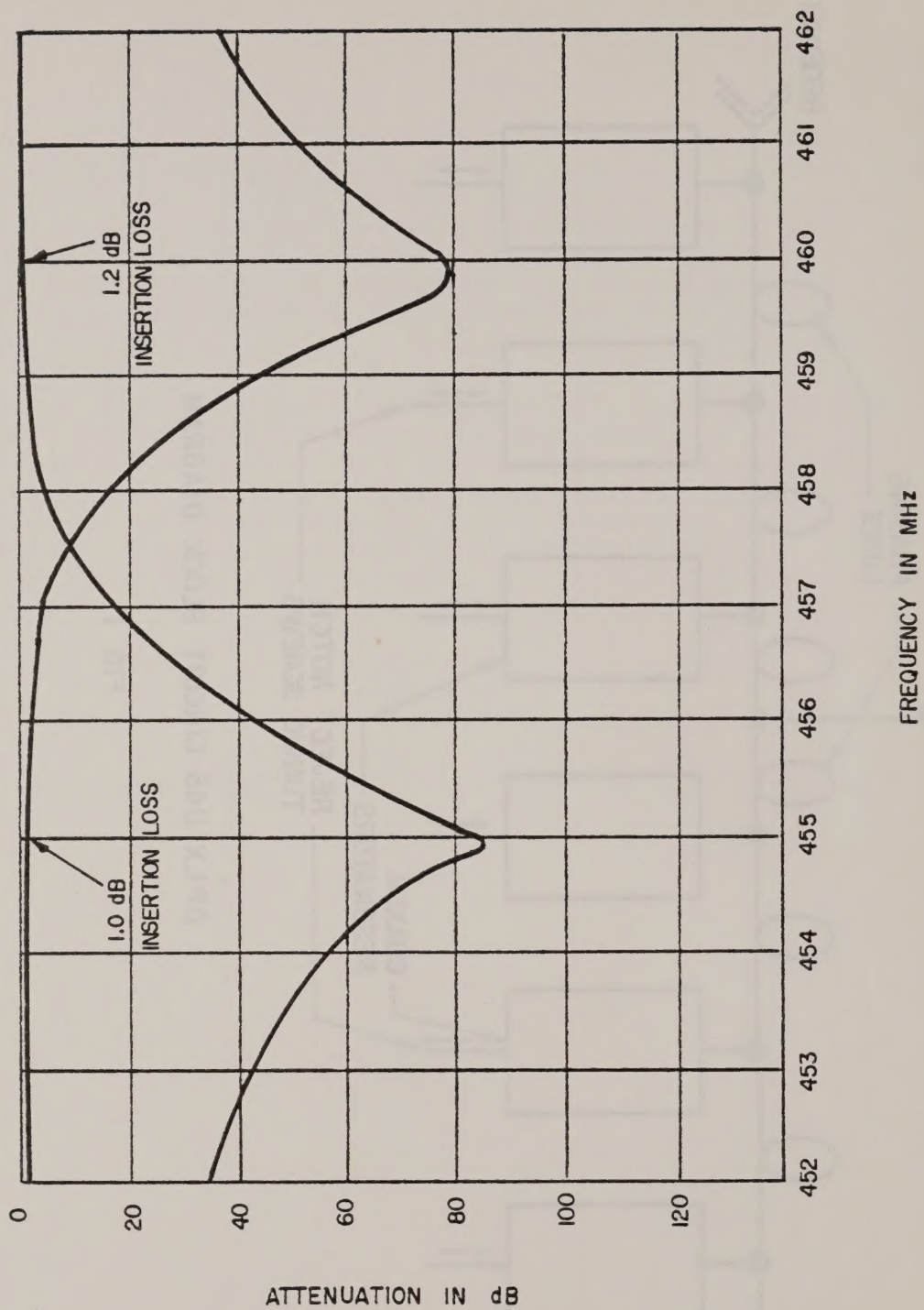
(CONTENTS)

BOOKLET SHOULD BE KEPT WITH TRANSMITTER POWER SUPPLY



DPLX U45 CIRCUIT BLOCK DIAGRAM

FIG. 1



DPLX U45
TX & RX RESPONSE CURVES

FIG 2

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	RELEASE R-201	9/25/79	Rew

PART NO.	2703-5427-100
FREQ. RANGE	406-470 MHz
NO. OF CAVITIES	6
FREQ. SEPARATION MHZ	5
POWER INPUT	50 WATTS
INSERTION LOSS:	
TX TO ANT	1.4 dB MAX
RX TO ANT	1.4 dB MAX
TX NOISE SUPP. AT RX FREQ	75 dB
RX ISOLATION AT TX FREQ	75 dB
TEMPERATURE RANGE	-40°C TO +70°C
MAXIMUM VSWR	1.3:1
RACK MOUNTING SCREWS	10-32 x .5
MAX. DIMENSIONS (W-D-H)	19" x 12" x 5 1/4"
WEIGHT	5 3/4 LBS
CONNECTORS	'N' FEMALE UHF FEMALE UHF FEMALE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES ARE

FRACT.	DEC.	ANG.
±	.XX±	±
	.XXX±	

MATERIAL

FINISH

NEXT ASSY USED ON

APPLICATION

DO NOT SCALE DRWG

APPROVAL	DATE
DRAWN CMcC	9-79
CHECKED	
DFTG. SUPV.	
ENGR. Rew	9/79
CJI	9/21/79

by
Regency
COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

SPECIFICATIONS
DUPLER U45

SIZE A

PART NUMBER

104-249

REV

A

SCALE

~

SHEET

OF

1

REV	APPLICATION		REVISIONS			
	NEXT ASSY	USED ON	REV	DESCRIPTION	DATE	APPROVED
			A	R-211	11/1/79	ReW

TEST PROCEDURE

DUPLEXER ALIGNMENT FOR DPLXU45, DPLXU250 AND OTHER DUPLEXERS USED WITH REGENCY REPEATERS

I. Test Set-Up

A. Equipment

1. Network Analyzer H.P. 8754A with H.P. 8502 Transmission/Reflection Test Set or equivalent.
2. 50 ohm coaxial termination with VSWR = 1.05 or less in the 450-512 MHz frequency range.

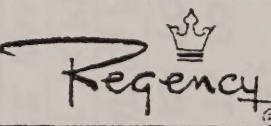
B. Alignment Criteria and Precautions

When aligning a duplexer, the technician must keep in mind the following operational objectives:

1. Suppression of the transmitter carrier into the receiver port.
2. Suppression of the transmitter noise at the receiver frequency into the receiver port.
3. Minimum insertion loss between the transmitter and antenna at the transmitter frequency.
4. Minimum insertion loss between the antenna and receiver at the receiver frequency.

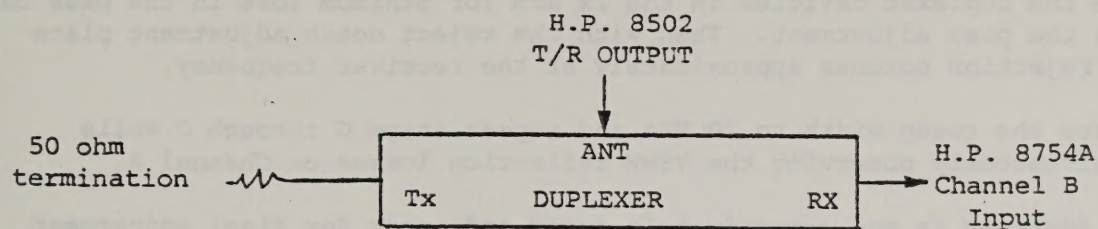
Duplexers must be tuned to achieve all of these objectives simultaneously. The following test interconnection diagrams allow simultaneous observations of the transmission and reflection losses at the duplexer input and output ports. Tuning adjustments can then be made with the transmission and reflection coefficients displayed on the network analyzer over the entire frequency range of operation. Optimization of the isolation notches can then be achieved within the limits of acceptable transmitter and receiver mismatch losses as viewed on the network analyzer display.

The usual procedure is to tune for widest and deepest isolation notches while restricting the antenna-to-transmitter and antenna-to-receiver reflection losses to an acceptable value, for example 14dB corresponding to a duplexer/antenna VSWR of 1.5 maximum.

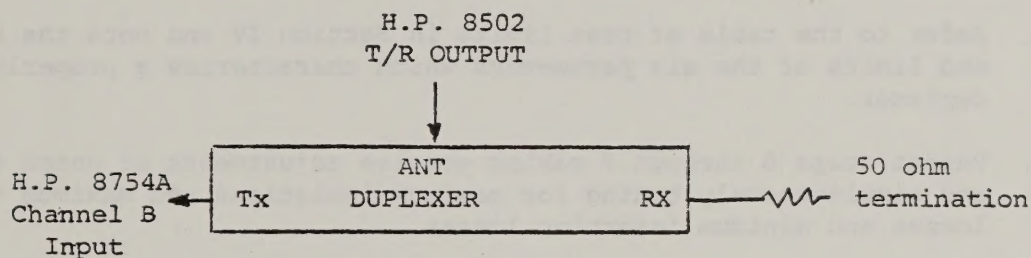
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT. DEC ANG. ± .XX± ± .xxx±	APPROVALS	DATE	 COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937			
	DRAWN <i>J. Williams</i>	10/31/79				
	CHECKED		TEST PROCEDURE DUPLEXER ALIGNMENT FOR DPLXU45, DPLXU250 AND OTHER DUPLEXERS USED WITH REGENCY REPEATERS			
	DFTG. SUPV.					
MATERIAL	ENGR. <i>ReW</i>	11/1/79	SIZE	PART NUMBER		REV.
FINISH			A	TP14-267		A
DO NOT SCALE DRWG.			SCALE			SHEET 1 OF 4

II. Test Interconnection Diagram

Connection #1:



Connection #2:



III. Measurement Procedure

- Connect the H.P. 8502 Transmission/Reflection test set to the H.P. 8754A Network Analyzer and turn the power switch on for a $\frac{1}{2}$ hour warm-up period.
- Channel A will show the reflection loss at the T/R test set output port, and Channel B will show the transmission through the duplexer port under test.
- With the T/R output open-circuited, adjust Channel A gain to center screen which then becomes the reference line for zero VSWR return loss.
- Adjust the center frequency to the center of operational band with the help of the 50 MHz and 10 MHz markers. Set the sweep width to 100 MHz.
- Terminate the T/R output with the 50 ohm termination and verify the return loss to be greater than 32dB.
- Connect the T/R output to Channel B input and adjust Channel B gain to the top display line, which then becomes the reference line for zero transmission loss.
- Connect the duplexer to the Network Analyzer and T/R test set as shown in Test Interconnection Diagram #1.
- Tune the duplexer cavities in the Rx arm for minimum loss in the pass band with the pass adjustment. Then with the reject notch adjustment place the rejection notches approximately at the transmitter frequency.

DRAWN	DATE	SIZE	PART NUMBER	REV.
APPROVED	DATE	A	TP14-267	A
DO NOT SCALE DWG.		SCALE	SHEET 2	

- I. Change the Channel B input to the Tx port as shown in Test Interconnection Diagram #2.
- J. Tune the duplexer cavities in the Tx arm for minimum loss in the pass band with the pass adjustment. Then with the reject notch adjustment place the rejection notches approximately at the receiver frequency.
- K. Reduce the sweep width to 20 MHz and repeat steps G through J while simultaneously observing the VSWR reflection losses on Channel A.
- L. The duplexer is now approximately tuned and ready for final adjustment of the notch frequencies, isolation and VSWR performances.
- M. Reduce the sweep width to 5 MHz and activate the 1 MHz markers.
- N. Refer to the table of test limits in Section IV and note the expected values and limits of the six parameters which characterize a properly tuned duplexer.
- O. Repeat steps G through J making precise adjustments of notch frequencies and simultaneously tuning for maximum isolations and maximum VSWR return losses and minimum insertion losses.

IV. Table of Test Limits

A. Definition of parameters:

RLTX = VSWR return loss of terminated transmitter port
 RLRx = VSWR return loss of terminated receiver port
 ILRxT = Isolation loss of receiver port at the transmitter carrier frequency
 ILTxR = Isolation loss of transmitter port at the receiver frequency
 ILRx = Insertion loss of receiver port at the receiver frequency
 ILTx = Insertion loss of transmitter port at the transmitter frequency

B. Parameter limits DPLXU45:

PARAMETER	MIN.	TYP	MAX.
RLTx	14dB	16dB	--
RLRx	14dB	16dB	--
ILRxT	75dB	77dB	--
ILTxR	75dB	80dB	--
ILRx	--	1.2dB	1.4dB
ILTx	--	1.0dB	1.4dB

C. Parameter limits DPLXU250:

PARAMETER	MIN.	TYP	MAX.
RLTx	14dB	16dB	--
RLRx	14dB	16dB	--
ILRxT	85dB	90dB	--
ILTxR	85dB	90dB	--
ILRx	--	0.8dB	1.0dB
ILTx	--	0.8dB	1.0dB

DRAWN	DATE	SIZE	PART NUMBER	REV.
APPROVED	DATE	A	TP14-267	A
DO NOT SCALE DWG.		SCALE	SHEET 3	

V. Mechanical Specifications

Mechanical specifications are shown on Regency drawing 104-249 for DPLXU45 and on Regency drawing 104-250 for DPLXU250.

DRAWN	DATE	SIZE	PART NUMBER	REV.
APPROVED	DATE	A	TP14-267	A
DO NOT SCALE DWG.		SCALE	SHEET 4	

